

## CLAIMS

What is Claimed is:

1. An optical position-tracking system comprising:  
an optical device for generating an incident light beam and a  
5 reference light beam from a light beam; and  
a light beam steering device for sweeping said incident light beam  
through an angular range to cause a reflection of said incident light beam by  
a target, wherein said reflection of said incident light beam is directed to  
interfere with said reference light beam to form an interference light beam,  
10 wherein a position of said target is determined using an interferometric  
technique utilizing an angular value of said incident light beam and said  
interference light beam, and wherein said angular value depends on said  
reflection.
- 15 2. The optical position-tracking system as recited in Claim 1  
further comprising a processing unit for determining said position of said  
target.
- 20 3. The optical position-tracking system as recited in Claim 1  
wherein said light beam has a single wavelength, and wherein said position  
of said target is a relative position.
- 25 4. The optical position-tracking system as recited in Claim 1  
wherein said light beam has a plurality of wavelengths, and wherein said  
position of said target is an absolute position.
5. The optical position-tracking system as recited in Claim 1  
wherein said target includes a retro-reflecting surface.
- 30 6. The optical position-tracking system as recited in Claim 1  
wherein if said target reflects said incident light beam when said incident

light beam is at a particular angular value, said light beam steering device sweeps said incident light beam through a limited angular range that includes said particular angular value until said target fails to reflect said incident light beam.

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7. The optical position-tracking system as recited in Claim 1 wherein said light beam steering device is one of a MEMS (microelectromechanical system) motor beam steering device, a galvanometer beam steering device, an acousto-optic beam steering device, an electro-optic beam steering device, a grating structure beam steering device, a holographic structure beam steering device, and a scanning mirror beam steering device.

8. The optical position-tracking system as recited in Claim 1 wherein said light beam is generated by a light source selected from a group consisting of an incandescent technology-based light source, a LED (light emitting diode) technology-based light source, a semiconductor laser technology-based light source, and a rare-earth laser technology-based light source.

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9. A system comprising:  
an optical device for generating an incident light beam and a reference light beam from a light beam;  
a light beam steering device for sweeping said incident light beam through an angular range to cause a reflection of said incident light beam by a target, wherein said reflection of said incident light beam is directed to interfere with said reference light beam to form an interference light beam, wherein a position of said target using an interferometric technique utilizing an angular value of said incident light beam and said interference light beam, and wherein said angular value depends on said reflection; and

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a computer system for receiving and using said position of said target.

10. The system as recited in Claim 9 further comprising a  
5 processing unit for determining said position of said target.

11. The system as recited in Claim 9 wherein said light beam has a  
single wavelength, and wherein said position of said target is a relative  
position.  
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12. The system as recited in Claim 9 wherein said light beam has a  
plurality of wavelengths, and wherein said position of said target is an  
absolute position.

13. The system as recited in Claim 9 wherein said position enables  
controlling a cursor in said computer system.  
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14. The system as recited in Claim 9 wherein said position enables  
inputting data into said computer system.  
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15. The system as recited in Claim 9 wherein said target includes a  
retro-reflecting surface.

16. The system as recited in Claim 9 wherein if said target reflects  
25 said incident light beam when said incident light beam is at a particular  
angular value, said light beam steering device sweeps said incident light  
beam through a limited angular range that includes said particular angular  
value until said target fails to reflect said incident light beam.

17. The system as recited in Claim 9 wherein said light beam  
30 steering device is one of a MEMS (microelectromechanical system) motor

beam steering device, a galvanometer beam steering device, an acousto-optic beam steering device, an electro-optic beam steering device, a grating structure beam steering device, a holographic structure beam steering device, and a scanning mirror beam steering device.

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18. The system as recited in Claim 9 wherein said light beam is generated by a light source selected from a group consisting of an incandescent technology-based light source, a LED (light emitting diode) technology-based light source, a semiconductor laser technology-based  
10 light source, and a rare-earth laser technology-based light source.

19. A method of optically tracking a target, said method comprising:  
generating an incident light beam and a reference light beam from a  
light beam;  
15 sweeping said incident light beam through an angular range and  
determining an angular value of said incident light beam;  
when said target reflects said incident light beam to generate a  
reflected light beam, directing said reflected light beam to interfere with said  
reference light beam to form an interference light beam; and  
20 determining a position of said target using an interferometric  
technique utilizing said angular value of said incident light beam and said  
interference light beam, wherein said angular value depends on said  
reflected light beam.

20. The method as recited in Claim 19 wherein said incident light  
25 beam has a single wavelength, and wherein said position of said target is a  
relative position.

21. The method as recited in Claim 19 wherein said incident light  
30 beam has a plurality of wavelengths, and wherein said position of said target  
is an absolute position.

22. The method as recited in Claim 19 wherein said target includes a retro-reflecting surface.

5           23. The method as recited in Claim 19 wherein said sweeping step includes:

          if said target reflects said incident light beam when said incident light beam is at a particular angular value, sweeping said incident light beam through a limited angular range that includes said particular angular value  
10       until said target fails to reflect said incident light beam.

          24. The method as recited in Claim 19 wherein said sweeping step is performed by a light beam steering device, and wherein said light beam steering device is one of a MEMS (microelectromechanical system) motor  
15       beam steering device, a galvanometer beam steering device, an acousto-optic beam steering device, an electro-optic beam steering device, a grating structure beam steering device, a holographic structure beam steering device, and a scanning mirror beam steering device.

20           25. The method as recited in Claim 19 wherein said light beam is generated by a light source selected from a group consisting of an incandescent technology-based light source, a LED (light emitting diode) technology-based light source, a semiconductor laser technology-based light source, and a rare-earth laser technology-based light source.

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